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BIOLOGICAL INVESTIGATIONS OF THE DEEP SEA. 50. THE VALIDITY AND GENERIC POSITION OF *PENTAGONASTER PARVUS* PERRIER (ECHINODERMATA, ASTEROIDEA)[1]

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When Perrier reported on the sea stars collected by the *Blake* (1881, 1884), one of the new species he described was *Pentagonaster parvus*. Verrill (1899: 151–156) examined the syntypes of *Pentagonaster parvus* and concluded that they were young specimens of *Goniaster americanus* Verrill (= *Asterias tessellatus* Lamarck). I have examined the syntypes of *P. parvus*, as well as many other specimens. I have also examined many young specimens of *Goniaster tessellatus* and have concluded that *Pentagonaster parvus* is a valid species belonging to the genus *Tosia*.

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Tosia parva (Perrier, 1881)

Pentagonaster parvus Perrier, 1881, p. 19; 1884, pp. 36, 37, 231, pl. 7, figs. 7–8.—Sladen, 1889, pp. 265, 267, 746–747.—?H. L. Clark, 1898, p. 5.
Goniaster americanus (pars) Verrill, 1899, pp. 154–156, pl. 26, fig. 6.
Plinthaster dentatus (pars) Gray, et al., 1968, fig. 25.

Material studied: 22 specimens from the following localities: Lectotype: R = 10.5 mm, r = 7.5 mm, R/r = 1.4; *Blake* sta. 253, off Grenada,

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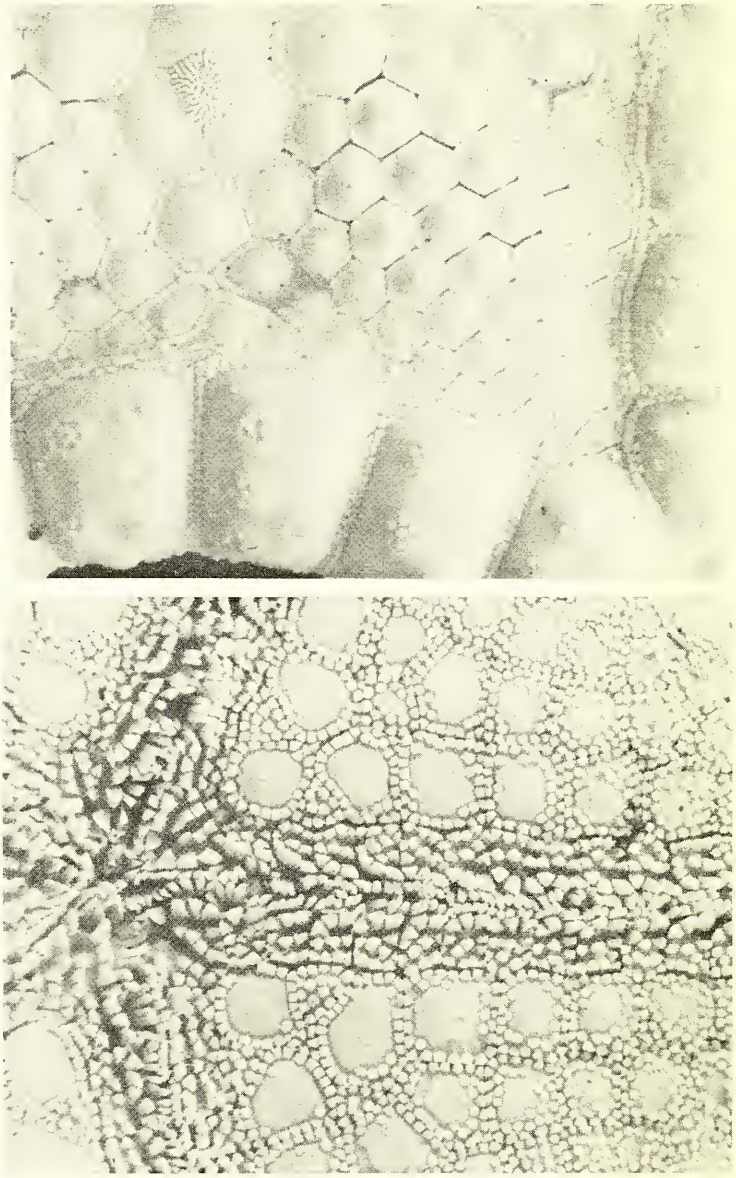

FIG. 1. *Tosia parva* (Perrier). Top, specimen from *Pillsbury* sta. 707, abactinal view, 6.1×.—Bottom, specimen from *Silver Bay* sta. 2263, actinal view, 7.8×.

168 m, 1878–79, MCZ 417.—Paralectotypes: *Blake*, West Indies, 172–229 m, 1877–79, MC 4283, (3 spec.).—1 spec., M/V *Silver Bay* sta. 2263, 33°04′N, 78°12′W, 30 m, 28 July 1960, UMML 40.149.—1 spec., R/V *Hernando Cortez* sta. E, 27°36′N, 84°13′W, 73 m, 4 January 1966, USNM E10851.—1 spec., M/V *Silver Bay* sta. 3496, 20°53′N, 73°42′W, 183, 4 November 1961, UMML 40.159.—1 spec., R/V *Pillsbury* sta. 478, 11°33′N, 62°09′W, 597 m, 2 August 1966, UMML 40.235.—2 spec., R/V *Pillsbury* sta. 707, 11°22′N, 62°22′W, 79 m, 19 July 1968, UMML 40.236.—13 spec., R/V *Pillsbury* sta. 734, 11°01′N, 63°35′W, 60–71 m, 22 July 1968.

Diagnosis: R not greater than 30 mm; R/r = 1.3–1.8. Abactinal and marginal plates bearing scattered granules in centers. Peripheral granules of abactinals in radial areas fused. Actinals surrounded by more than single row of granules. Five compressed adambulacral furrow spines; nine to ten mouth furrow spines.

Description: Five arms. R = 22 mm, r = 46 mm, R/r = 1.5. General from pentagonal to arcuate pentagonal.

Five primary plates conspicuously larger than other abactinals. Abactinal plates slightly convex; each surrounded by single row of large, flattened, rectangular granules. Granules surrounding plates in radial areas fused so that each plate surrounded by flattened, calcareous ring. Center of each abactinal plate bearing one to six round granules embedded in deep pits. Papulae confined to large radial areas.

Inferomarginals and superomarginals corresponding throughout wide interbrachial arc. Eight massive superomarginal plates; each surrounded by single row of small, rounded granules. Clusters of one to twelve round granules, similar to those of abactinals, scattered about each plate. Double row of large, flattened granules, similar to those surrounding abactinals along suture between superomarginals and inferomarginals. Granules twice as large at angle formed by two adjacent superomarginals and corresponding inferomarginals. Each enlarged granule bearing single, very small, rounded granule. Terminal plate small, naked. Ten massive inferomarginal plates; granulation similar to superomarginals.

Actinal intermediate area large; plates arranged in five chevrons. Actinal plates large, flat, rhombic; each plate surrounded by two to three irregular rows of coarse, rounded granules. Most plates having large naked central area; some plates bearing one to four scattered granules in central area.

Adambulacral plates square with straight furrow margin bearing five subequal, compressed furrow spines with blunt, rounded tips. Subambulacral spines in three to four irregular rows of three to five short, blunt spinules slightly taller than granules of actinal plates.

Each mouth plate bearing nine to ten furrow spines, similar to adambulacral furrow spines, but more strongly compressed, median spine being most compressed; median spine only slightly enlarged. Rest of plate covered by ten to twelve pyramidal spinules, slightly taller than subambulacral spines of adambulacrals.

Anus prominent, subcentral. Madreporite roundly triangular, about two-thirds as large as adjacent abactinal plates; located approximately one-third the distance from center of disk to middle of interbrachial arc. No pedicellariae.

Type: Museum of Comparative Zoology, cat. no. 417 (lectotype).

Type-locality: off Grenada, 168 m, *Blake* sta. 253.

Distribution: This species is found throughout the Antillean province, extending from 50 miles south of Cape Fear, North Carolina to Trinidad. Its bathymetric range is 30–597 m.

Discussion: The smallest specimen examined measures R = 6 mm. All its characters are the same as in an adult, except the peripheral granules of the abactinals of the radial areas are not yet fused.

The smallest specimen of *Goniaster tessellatus* l examined (R = 9 mm) is distinguished from *Tosia parva* by having naked superomarginals and the abactinal and actinal plates completely covered by granules. Specimens as small as R = 11 mm already have abactinal spines forming.

Pentagonaster parvus Perrier belongs in *Tosia* because of its pentagonal form, actinal granulation and lack of pedicellariae. It is distinguished from all other species of *Tosia* by its central abactinal and marginal granules. It is the only species of *Tosia* not from Australian waters and is a Tethyan relict.

The specimen collected at *Blake* station 253 is designated the lectotype and the type locality is restricted to off Grenada, 168 m. The specimens collected by the *Blake* at stations 32, 276 and 296 have been placed together and it is impossible to determine which specimen is from which station. These three specimens are designated the paralectotypes.

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